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AUTHOR Ruggiero, Richard M.
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ABSTRACT

Intended to assist media managers in making appropriate decisions and planning allocations of resources for an instructional program, this study was designed to determine if captions displayed on instructional video programs interfere with learning in hearing audiences. Subjects were 80 university students enrolled in five undergraduate general education classes, who were randomly assigned to one of two groups of 40 subjects, all of whom were drawn from a hearing population. The materials used included a 30-minute instructional videotape, a 35-item test on content, a 12-item self-report questionnaire which was used to obtain demographic data on the subjects, and a 16-item Likert-scaled postquestionnaire which assessed the attitudes of the students toward captions and viewing captioned materials in an instructional setting. Results indicated no significant differences in the scores on the test of knowledge between subjects who viewed the video with captions displayed and the group who viewed the identical video presentation without captions. Tables comparing survey results are included and 16 references are listed. (DJR)

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Television Captioning, Interference, and A Hearing Audience: A Media Management Question

by

Richard M. Ruggiero

Associate Professor

Coordinator Project Initiation and Development

Instructional Media Center

California State University, Northridge

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San Francisco, California

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Televised instructional materials, whether produced specifically for the classroom or obtained from commercial sources, are used regularly in instruction. Many of these programs are captioned for the hearing-impaired. Would the viewing of these programs with the captions showing (as subtitles) interfere with the learning process of students who do not have a hearing problem? The purpose of this study was to determine if captions displayed on instructional video programs interfere with learning in hearing audiences so that media managers can make appropriate decisions and plan the allocation of resources to best serve an entire instructional program. Captions have not been used with hearing audiences because, as the National Captioning Institute (NCI) points out, "many viewers without hearing impairments find ordinary subtitles, called open captions, distracting" (Farrell, 1984). There is no research currently available that investigates this question. If captions are found to cause genuine interference in the learning process a case can be made for adequate funding to create and staff separate viewing facilities for the hearing impaired. If, on the other hand, captions are found not to interfere with learning, media managers can then direct their resources towards the showing of captioned materials in regular classes when hearing-impaired students are present. In either case, both the letter and spirit of Public Law 504, which requires that all students be provided equal access to educational opportunities, will be met because the decision will have been based upon research rather than suppposítions.

There appears to be no research that deals directly with captioning and its effect upon a normal hearing audience. Captioning, as a service to assist the hearing-impaired, has benefited from improvements in technology and, as a result, many hours of captioned programming are now available through the closed-captioning technique. The National Captioning Institute has developed standards by which most programming is captioned; however, the considerations employed in the captioning process are based on research conducted with the hearing-impaired, most of whom have been children. Consequently, it is not uncommon to see the captions either preceed or follow the audio portion of a program. Furthermore, captions are targeted at not more than a sixth grade reading level and often substitute vocabulary or delete words for readibility and timing purposes.

Captions have been shown to improve learning when viewed by the hearing-impaired (Gates, 1970; Fischer, 1971; Nix, 1971; Davila, 1972; Boyd and Vader, 1972; Nomeland, 1972); however, reading level influences the degree to which a hearing-impaired viewer, aged 8-18, comprehends the content of the captions (Braverman, 1981). Since all of the research was directed at the hearing-impaired, it has limited application to the investigation of possible interference with a normal hearing audience.

A recent study has shown that captions have been successful in teaching English as a Second Language to normal hearing students (Price, 1983), and some research is currently being conducted on the effectiveness of captioning in the teaching of

reading (Caption, 1984). Still, no one has shown that captions interfere with learning in a normal, hearing audience.

Text has become commonplace on television and all viewers "read" television to varying degrees. Thousands of words per week are found in news and sports programs and in commercials (Peters, 1980); however, this use of text bears little resemblance to captioning.

Research on the abiltiy of television to teach reading has been directed toward children and occurred primarily before the growth and development of the closed captioning process. In addition, none of the studies uses captions, per se, as part of the treatment. The research of Broadbent (1958) and Travers (1964) indicates that the rate of transmission of audio-visual material determines the extent to which a subject can simultaneously process information received through more than one sense or modality. At rates greater than 200 words per minute, subjects tended to block one channel. The experiments which were conducted used still pictures and were dependent upon simultaneous transmission of pictures and sound. In contrast, closed-captioned television employs moving pictures and, because it is produced for the hearing-impaired, is not concerned with the precise syncronization of dialogue and captions. Furthermore, captioned television transmits information in what can be considered three channels--two visual and one aural. Processing information received through these three channels simultaneously may itself cause interference.

Researchers have become more aware of the uses of text on television and have suggested that educators pay more attention to the instructional potential it offers not only to children but to adults as well (Peters, 1979,1980; Kinnamon, 1975; Adams and Harrison, 1975; Feeley, 1975). This is particularly important since the origination of regularly scheduled closed-captioned television in 1980. The research that has been conducted which relates to closed-captioned television deals primarily with the hearing-impaired viewer. This is understandable in view of the fact that closed-captioning was created for a hearing-impaired audience; however, the time has come to conduct inquires into the potential benefit that captioning may hold for the non-hearing-impaired viewer. This study represents the foundation of that inquiry by first establishing whether or not viewing an instructional program with both sound and captions creates a unaccaptable distraction for the normal hearing viewer.

In order to accomplish this, the following questions were asked:

1) Does captioning interfere with the learning of hearing students when viewing an educational video presentation?
2) Will there be any difference in students' attitudes toward captioning following the viewing of a captioned educational video presentation?

METHOD

Subjects

Eighty university students, representing 31 different majors, enrolled in 5 undergraduate general education classes were randomly assigned to one of two groups of 40 subjects. All subjects in the study were drawn from a hearing population.

Materials

A 30-minute instructional videotape was selected from the telecourse, The New Literacy, produced by the Southern California Consortium for Community College Television and captioned by the National Captioning Institute. A 35-item test on the content of the program was developed from the telecourse test materials and a series of questions contained in the teacher's manual provided with the permission of the Southern California Consortium for Community College Television. Each question on the test was identified as belonging to one of four test item levels created by the course authors. The four level taxonomy and the number of test questions at each level was as follows: Level 1, nine questions representing recall of facts; Level 2, twelve questions requiring the recall of implications or interpretations; Level 3, eight questions requiring the application of facts, implications, or interpretations to new situations; and Level 4, six questions requiring a subject to make judgments or decisions about something not specifically covered previously. Prior to conducting the study, the test was

administered to a randomly selected group of 25 subjects who did not view the video presentation. This group served as a control for the test itself. Subjects in this group achieved a mean score of 16.80 which would later be compared with the mean scores of the Caption and Non-Caption groups in the study to establish that the test was a measure of knowledge gained from viewing the video presentation.

A 12-item self-report preliminary questionnaire was designed to collect data on each subject's sex, age, knowledge of computers, and current major. A 16-item Likert-scaled postquestionnaire was developed to assess the subject's attitude toward captions and the viewing of captioned materials in an instructional setting. Both questionnaires were created by the researcher.

Procedure

Prior to the viewing of any video, Ss completed the self-report questionnaire. After filling out the questionnaire, Ss viewed a 30-minute instructional program captioned by the National Captioning Institute. Ss in Group 1 viewed the program with both captions and sound while Ss in Group 2 viewed it with sound only.

After viewing the program, Ss in each group were tested on the content of the program. Following completion of the test, Ss in both groups were asked to complete the Likert-scaled attitudinal survey consisting of a series of statements regarding captions.

RESULTS

The analysis utilized a Posttest Only Control Group Design with separate t tests for each outcome measure. There was no significance found for total score (t=0.96, df=78, p<.338) or any of the four taxonomy levels established: Level 1 (t=1.62, df=78, p<.110), Level 2 (t=0.77, df=78, p<.444), Level 3(t=-0.46, df=78, p<.646), Level 4 (t=1.11, df=78, p<.269), on the posttest administered to both groups of subjects (Table 1).

Table 1: Mean Scores Posttest

Variable	N	# Items	Mean	Std Dev	T Value	df	p
Level 1							
Group 1	40	9	4.0250	.947	1.62	78	.110
Group 2	40	9	3.6500	1.122			
Level 2							
Group 1	40	12	8.8250	1.107	.77	78	.444
Group 2	40	12	8.6000	1.482			
Level 3							
Group 1	40	8	6.6000	1.374	-.46	78	.646
Group 2	40	8	6.7500	1.532			
Level 4							
Group 1	40	6	2.5500	1.377	1.11	78	.269
Group 2	40	6	2.2250	1.230			
Score							
Group 1	40	35	25.8250	3.862	.96	78	.338
Group 2	40	35	24.9750	4.016			

Student's attitude toward captioning was analyzed by first using Principal Axis Factor Analysis with an Orthoginal Verimax Rotation. This was accomplished by removing four neutral items from the 16-item attitudinal survey, and then employing the factor analysis on the remaining 12 items. This revealed two factors. Of the 12 remaining questions, nine were clearly related to a subject's attitude towards the captioning of instructional video programs without regard to the hearing-impaired--called a general factor, and three were concerned with the viewing of captioned video programs in an instructional setting taking into consideration the hearing-impaired population--called a segregation factor (Table 2). As a measure of internal consistency Cronbach alpha coeffecients were computed for both the general and segregation factors of the attitude survey. The alphas were .887 and .632 respectively. There was no significance found in the t tests (Table 3) performed on both the general ($t=-0.73$, $df=78$, $p<.467$) and segregation factors ($t=1.85$, $df=78$, $p<.069$).

Table 2: Principal Axis Factor Analysis with an Orthoginal Varimax Rotation

Attitude Question	Factor 1	Factor 2
1	.77131*	-.00596
2	.81815*	-.02690
4	.57015*	.20609
5	.64473*	.36592
7	.70179*	.31207
8	.72513*	.30720
9	.76931*	.00277
11	.19793	.67553*
12	.75747*	.01758
13	.59792*	.36133
14	.08756	.74203*
16	-.00270	.74680*

2 Factor Analysis of Attitudinal Survey after Removal of Neutral Items (*Criteria for Interpreting Factor=.4)

Table 3: t-tests of Attitude Factors Between Groups

Factor	Group	N	Mean	SD	t	df	p
General	Caption	40	29.425	7.76	-.73	78	.467
	Non-Caption	40	30.500	5.13			
Segregation	Caption	40	12.475	2.16	1.85	78	.069
	Non-Caption	40	11.475	2.66			

DISCUSSION

These data indicate that, contrary to the supposition that captions are distracting and hence would interfere with learning, there was no significant difference in the mean score on the test of knowledge between subjects in this study who viewed the

instructional video presentation with captions displayed and a similar group of subjects who viewed the identical video presentation without the captions displayed. Furthermore, when taking into consideration the four taxonomy levels in the test of knowledge, no significant differences between groups were found at any level. The nonsignificant findings cannot be explained away by suggesting that the test was not a measure of knowledge gained as a result of viewing the video presentation since both groups scored 25.83 and 24.98 respectively as compared to the test control group mean score of 16.80.

This finding calls into question the current practice of excluding the hearing-impaired from the regular classroom experience when captioned video programs are shown in classes without the captions displayed. It should not prevent media managers from establishing, funding, and staffing separate viewing facilities for the hearing impaired, but when limited funds are available, managers should consider the allocation of their resources to support mainstreaming activities.

The survey of attitude toward captions on instructional video presentations revealed no significant differences between the captioned and non-captioned group. In this instance, factor analysis identified two constructs in the attitudinal survey. No difference was found between groups on the general construct; however, the segregation construct which dealt with how students felt about viewing captioned instructional materials when a hearing-impaired student was present in the class approached significance ($p<.069$). This may be attributed to empathy

subjects in the experimental group may have after actually experiencing a video presentation with captions showing.

As a management question this study presented a worst case scenario for interference when captions are shown in an instructional setting, and it closely replicates the occassional use that instructional video has in higher education. Further research should be conducted with other subject matter, different levels of learners, and learners with special requirements. In addition, where a series of video presentations are used repeatedly in the same class, research should be conducted on the effect of captioned material over time. This study, however, should provide managers with a reasonable reference when attempting to reconcile mainstreaming requirements and financial constraints.

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